REMARKS

This Amendment is filed in response to the Office Action dated December 11, 2008. For the following reasons this application should be allowed and the case passed to issue. No new matter is introduced by this Amendment. New claim 9 is supported by the specification at page 19.

Claims 1-9 are pending in this application. Claims 1-8 have been rejected. New claim 9 has been added in this response.

Claim Rejections Under 35 U.S.C. § 103

Claims 1 – 8 were rejected under 35 U.S.C. § 103 (a) as unpatentable over Miyazaki et al. (US 6,423,446) in view of Yasui et al. (JP 2001-179151) and further in view of Watanabe et al. (JP 08-229481) or Yasuaki et al. (JP 11-317218), and still further in view of Hwang Seok (KR 2002-0016357).

This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested. The following is a comparison between the present invention, as claimed, and the cited prior art.

An aspect of the invention, per claim 1, is a method for producing lithium ion secondary batteries, comprising the steps of preparing an electrode sheet with lead-forming parts and intermittently forming porous insulating layers comprising an inorganic oxide filler and a binder on a surface of the electrode sheet excluding the lead-forming parts. A lead is connected to each of the lead-forming parts and the batteries are fabricated by using the electrode sheet to which the leads are connected. The step of intermittently forming porous insulating layers comprises a step of applying a slurry comprising the inorganic oxide filler and the binder to the outer surface of a gravure roll, and transferring the slurry applied to the outer surface of the gravure roll onto a

surface of the electrode sheet that is being transported by a plurality of guide rolls, excluding the lead-forming parts; and a step of moving at least one selected from the gravure roll and the guide rolls to move the electrode sheet away from the gravure roll at the lead-forming parts. The gravure roll is disposed between said plurality of guide rolls.

The combination of Miyazaki et al., Yasui et al., Watanabe et al., Yasuaki et al., and Hwang Seok does not suggest the claimed method for producing lithium ion secondary batteries because Miyazaki et al., Yasui et al., Watanabe et al., Yasuaki et al., and Hwang Seok, whether taken alone, or in combination, do not suggest intermittently forming porous insulating layers comprising an inorganic oxide filler and a binder on the surface of an electrode sheet by applying a slurry comprising the inorganic oxide filler and the binder to the outer surface of a gravure roll, and transferring the slurry applied to the outer surface of the electrode sheet, and moving at least one selected from the gravure roll and the guide rolls to move the electrode sheet away from the gravure roll at the lead-forming part, wherein the gravure roll is disposed between the plurality of guide rolls, as required by claim 1.

The present invention relates to a technique for applying selectively a slurry for forming a porous insulating layer only on a surface of an active material layer formed intermittently on a surface of an electrode sheet. For this reason, the electrode sheet is alternately and repeatedly brought into contact with and moved away from a gravure roll. The slurry forming the porous insulating layer is an inorganic oxide filler and a binder dispersed in a liquid component. The active material layer is a electrically conductive whereas the porous insulating layer of the present invention is not an electrically conductive layer.

According to the present invention, in order to form lead-forming parts where the slurry is not applied, the gravure roll 13 and the electrode sheet 14 are moved apart from each other at a

predetermined interval to perform intermittent application. The intermittent application of the present invention is described in further detail with reference to Fig. 1. As shown in Fig. 1, tension is applied to the electrode sheet 14 from the guide rolls 11, 12, and the gravure roll 13. In this state, either one of the guide rolls 11, 12, and the gravure roll 13 is moved to allow the electrode sheet 14 to be apart from the gravure roll 13, whereby the tension from the gravure roll 13 is removed. This breaks the dynamic balance maintained by the four members (i.e., the guide rolls 11, 12, the gravure roll 13, and the electrode sheet 14), causing the electrode sheet 14 to vibrate. The vibration of the electrode sheet 14 generally would make it difficult to form a thin and uniform film. Against this expected technical problem, the present invention has succeeded in forming a uniform porous insulating layer.

Contrary to the Examiner's assertion, Miyazaki et al. do not disclose intermittently forming porous **insulating** layers comprising an inorganic oxide filler and a binder on the surface of an electrode sheet by applying a slurry comprising the inorganic oxide filler and the binder to the outer surface of a gravure roll, and transferring the slurry applied to the outer surface of the electrode sheet, as required by claim 1. Miyazaki et al. disclose applying a slurry of an inorganic oxide **active** material and a binder on a collector with a prescribe pattern (column 2, lines 58-65 and column 4, lines 43-49). The inorganic oxide **active** material and binder would not be an insulating layer. Rather, in order for the battery to function, the **active layer must be conductive**.

Miyazaki et al. (column 5, lines 43-56) further teach a polymer resin layer formed on the surface of the current collector and the active material layer formed on the surface of the polymer resin layer. In the present invention, on the other hand, a polymer resin layer is not formed on the surface of the current collector. The polymer resin layer is provided to partially exfoliate the

active material layer in order to create the prescribed pattern of the active material layer. Miyazaki et al. further teach (column 12, lines 13-29) a coating liquid of the polymer resin applied onto the whole surface of the current collector by gravure coating to form the polymer resin layer. The gravure roll, however, is not moved away from current collector during the application of the coating liquid.

Contrary to the Examiner's characterization of paragraphs [0036] – [0040] of Yasui et al. as teaching moving at least one of the gravure and guide rolls away from the sheet at a lead forming part, the cited paragraphs, as well as the entire disclosure of Yasui et al., fail to suggest movement of at least one of the gravure and guide rolls away from the sheet at a lead forming part as recited in claim 1. Though the Examiner referred to paragraph [0036], it appears the Examiner was referring to paragraph [0038], as paragraph does not disclose anything about moving at least one of the gravure and guide rolls away. Paragraph [0038], however, discloses a change in the position of the doctor blade 25 and a change in the rotating direction of the gravure roll 13. It is the doctor blade 25 that moves, however, not one of the gravure roll and guide rolls. The doctor blade 25 is a plate-shaped part used for adjusting the amount of paste on the surface of the gravure roll 13. Neither the gravure roll 13, nor the guide rolls are moved away from the sheet when the doctor blade is moved. While the gravure roll 13 can change its direction of rotation, it does not move away from the sheet. In Yasui et al., the gravure roll is always in contact with the sheet while the paste is being applied.

Furthermore, Yasui et al. is directed to plastering a sheet with paste. The plastering is not an intermittent process, but rather, the entire sheet is plastered. If the gravure roll is moved away from the sheet, the desired plastering of Yasui et al. cannot be performed. Therefore, Yasui et al.

moves the pair of attitude control rolls 12 and the gravure roll only at the start and end of the process of applying the coating agent to base material 10.

Watanabe et al. disclose a device for intermittently applying a coating agent, such as a coating liquid, past, ink, slurry, etc. Watanabe et al. do not disclose the porous insulating layer, as claimed. The device comprises a roll and a coating agent spraying nozzle facing the peripheral surface of the roll. A base material is carried onto the peripheral surface of the roll, and a coating agent is intermittently applied onto the outer surface of the base material from the coating agent spray nozzle. Watanabe et al. do not teach applying a coating agent onto the outer surface of the base material by means of bringing a roll carrying a coating agent on its peripheral surface into contact with a base material. The intermittent application of Watanabe et al. is performed by generating pressure in the coating agent spray nozzle. The pressure becomes a negative pressure against the coating agent spraying direction, and thereby suppresses the coating agent spraying. Watanabe et al. do not disclose a step of moving at least one selected from the gravure roll and the guide rolls to move the electrode sheet away from the gravure roll at the lead-forming parts, wherein the gravure roll is disposed between said plurality of guide rolls, as required by claim 1.

In Yasuaki et al., a base material is an electrode core member having a smooth surface before forming an electrode material mixture layer. Yasuaki et al. apply an active material paste, not a slurry for forming the porous insulating layer, as required by claim 1. The application roll 22 of Yasuaki et al. appears to be a smooth roll. Further, application roll 22 and back-up roll 23 are disposed adjacent to each other. Furthermore, in the space between application roll 22 and back-up roll 23, an electrode material mixture is applied onto sheet 28. Sheet 28 is an electrode core member having a smooth surface. The application roll 22 and back-up roll 23 are always

disposed apart from each other so that a uniform application of an electrode mixture is applied to the base material. Yasuaki et al. do not disclose a step of moving at least one selected from the gravure roll and the guide rolls to move the electrode sheet away from the gravure roll at the lead-forming parts, wherein the gravure roll is disposed between said plurality of guide rolls, as required by claim 1.

Hwang Seok uses a coating roll having a smooth surface, not a gravure roll. Further, the coating roll 60 is opposed to a rubber ball 40 with a sheet interposed between the rolls. As a result, a practically constant tension is applied to the sheet, and the tension applied to the sheet is not changed corresponding to the unevenness on the surface of the sheet. Thus, a uniform thickness cannot be achieved. For this reason, an adjustment roll 70 is disposed on the downstream side of the coating roll 60 to provide uniform thickness of the coated film. The present invention, however, achieves uniform thickness without the use of an adjustment roll.

In the present invention, the gravure roll and guide rolls are configured such that the electrode sheet does not come into contact with the guide rolls at the position where the electrode sheet contacts the gravure roll. Such a positional relationship maintains a fixed dynamic balance among the respective members. Thus, in the present invention, an electrode material mixture can be applied onto an electrode sheet having microscopic asperities formed at a fixed interval on the surface, with the thickness being uniform regardless of asperities. The present invention enables a porous insulating layer having uniform thickness formed on the surface of the electrode sheet. Batteries using electrodes formed according to the present invention prevent the occurrence of short circuits and the expansion of short circuits, provide uniform charge and discharge, and have a high cycle capacity retention rate.

Obviousness can be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge readily available to one of ordinary skill in the art. *In re Kotzab*, 217 F.3d 1365, 1370 55 USPQ2d 1313, 1317 (Fed. Cir. 2000); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992); *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988). There is no suggestion in either Miyazaki et al., Yasui et al., Watanabe et al., Yasuaki et al., or Hwang Seok to intermittently form porous insulating layers comprising an inorganic oxide filler and a binder on the surface of an electrode sheet by applying a slurry comprising the inorganic oxide filler and the binder to the outer surface of a gravure roll, and transferring the slurry applied to the outer surface of the electrode sheet, and moving at least one selected from the gravure roll and the guide rolls to move the electrode sheet away from the gravure roll at the lead-forming part, wherein the gravure roll is disposed between the plurality of guide rolls, as required by claim 1.

The only teaching of the claimed method is found in Applicants' disclosure. However, the teaching or suggestion to make a claimed combination and the reasonable expectation of success must not be based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

The dependent claims, including new claim 9, are allowable for at least the same reasons as independent claim 1 and further distinguish the claimed method for producing lithium ion secondary batteries. For example, the cited references do not suggest the inorganic oxide filler is at least one selected from the group consisting of titanium oxide, aluminum oxide, zirconium oxide, tungsten oxide, zinc oxide, magnesium oxide and silicon oxide, as required by claim 9.

In view of the above remarks, Applicants submit that this application should be allowed and the case passed to issue. If there are any questions regarding this Amendment or the application in general, a telephone call to the undersigned would be appreciated to expedite the prosecution of the application.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

McDERMOTT WILL & EMERY LLP

Bernard P. Codd
Registration No. 46,429

600 13th Street, N.W.
Washington, DC 20005-3096
Phone: 202.756.8000 BPC:MWE
Facsimile: 202.756.8087
Date: March 11, 2009

Please recognize our Customer No. 20277 as our correspondence address.